Department of the Interior
Bureau of Reclamation

OPERATION AND MAINTENANCE EQUIPMENT AND PROCEDURES

RELEASE NO. 16

APRIL-MAY-JUNE 1956

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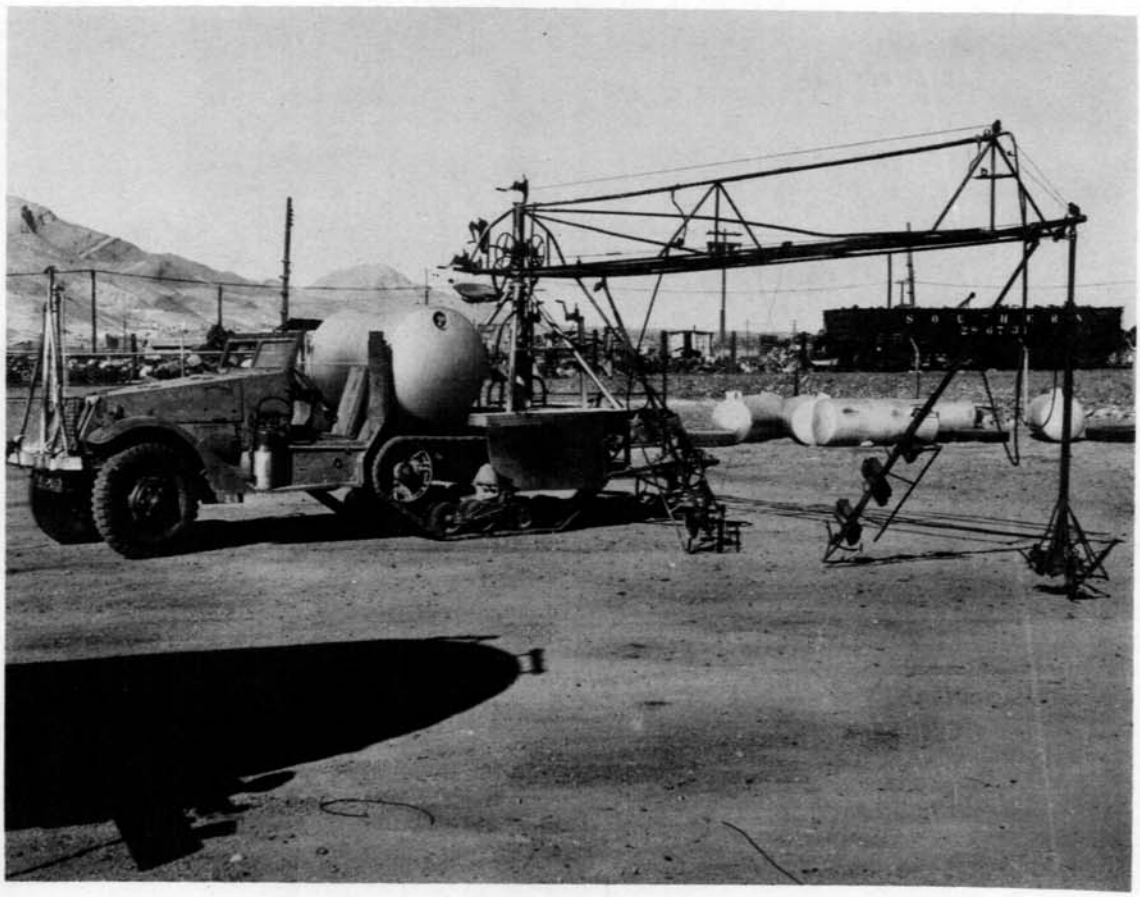


CONTENTS

Weed Control on Irrigation Systems

Release No. 1 is out of print and will not be reissued.

Releases No. 3, 8, 16, and 37 were on the subject of Weed Control Equipment and have been superceded by Release No. 97, "Equipment For The Prevention, Control, and Disposal Of Weeds On Irrigation Projects."

CONTENTS

(It is suggested that this table of contents replace that given in Release No. 3 and Release No. 8, of the Operation and Maintenance Equipment and Procedures Bulletins issued in March-April 1953 and April, May and June 1954. Pages indicated by (*) will be found in Release No. 3 and those indicated by (**) in Release No. 8.)

INTRODUCTION

This is Release No. 16 of the Operation and Maintenance Equipment and Procedures Bulletin, which is published Quarterly. The information in this Bulletin is assembled for the most part from suggestions by people engaged in the irrigation of our western lands. The Bulletin is printed in the Commissioner's Office, Denver, Colorado, by the Division of Irrigation Operations and is circulated for the benefit of Irrigation operation and maintenance people, with its principal purpose being to serve as a medium of exchange of operating and maintenance information. Reference to a trade name does not constitute an endorsement of a particular product and omission of any commercially available item does not imply discrimination against any manufacturer. It is hoped that the labor saving devices or less costly equipment developed by the resourceful water users will be a step toward commercial development of equipment for use on irrigation projects in continued effort to reduce costs and increase operating efficiency.

This issue of the Bulletin is being devoted entirely to the subject of weed control. Two previous issues of the Bulletin also were devoted to this subject: Release No. 3, issued in 1953 and Release No. 8, issued in 1954. This issue differs somewhat from the previous issues which were devoted primarily to equipment for combating undesirable weeds, in that several requests have been received and suggestions made that the Bulletin provide some up-to-date information concerning the types of chemicals and solvents best suited for the control of certain types of weeds and grasses. Such an article appears on page IVB1 of this issue, and is intended as an aid in detecting the limits of different types of hydro-carbons used in aquatic-weed killers.

You will note that this issue of the Bulletin has been punched for binding in a standard 3-ring binder. The subject matter also has been divided into sections to correspond with the subject matter of the previous issues. Therefore, the pages of this issue can be incorporated with those of the previous issues.

You also will note that a new index is provided which will replace and bring up to date all information published on the subject in this and previous issues.

A much greater distribution of Bulletins devoted to this subject is necessary because of the interest shown in weed control. For this reason, some information that has appeared in previous Bulletins devoted to general O&M equipment are being repeated.

For the benefit of those who did not receive the earlier releases on weed control, a few copies are available. If you are interested in receiving the earlier releases, please fill in the blank on the next page and forward it to the Bureau of Reclamation office located nearest you as follows:

Regional Director, Boise, Idaho
Regional Director, Sacramento, California
Regional Director, Boulder City, Nevada
Regional Director, Salt Lake City, Utah
Regional Director, Amarillo, Texas
Regional Director, Billings, Montana
Regional Director, Denver, Colorado
Assistant Commissioner and Chief Engineer, Denver, Colorado.

- -

Please forward copies of your Operation and Maintenance Equipment and Procedures Releases Nos. 3 and 8 to the following:

Name _____

Organization _____

Address _____

_____

- -

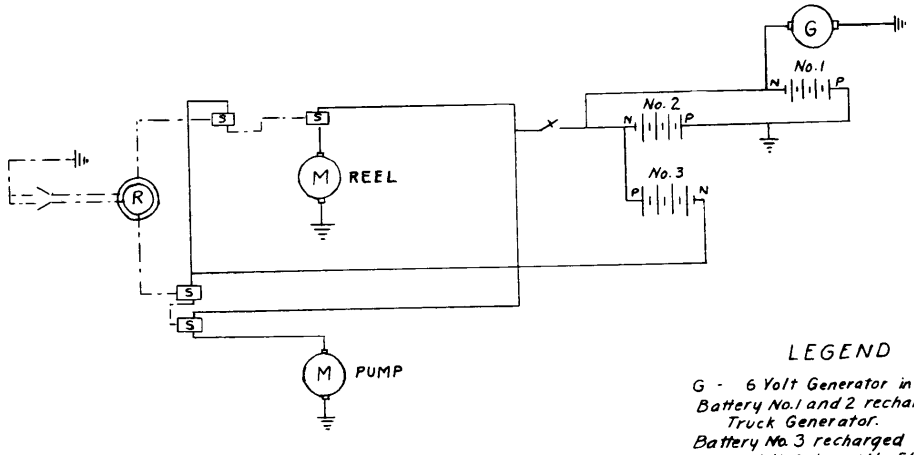
DESCHUTES WEIR POOL WEED SPRAYER

Use of the "Deschutes Weir Pool Weed Sprayer", planned and constructed by Mr. Huron D. Wise, heavy duty mechanic, Deschutes Project, Oregon, and used on the project, results in considerable savings in time, more weir pools and isolated areas being sprayed, and the spraying operation being much better than that usually performed with less efficient 3-gallon back-pack-type sprayers. The new device delivers the spray material from the spray wand held in the operator's hand in response to his pressing a button on the handle of the wand. The device is shown in the photograph below.

Construction:

The unique feature of this unit is the elimination of a gas engine for power. The pump and reel are both operated by two 6-volt starter motors with remote controls on the boom handle which gives the operator finger tip control when spraying 100 to 200 feet from the machine.

The unit is built on a metal base which can be placed in any one-half-ton pickup with room to spare. It has a tank capacity of 50 gallons. A diagram of the complete unit and a wiring diagram and details of the hollow bronze shaft are shown on the following pages.

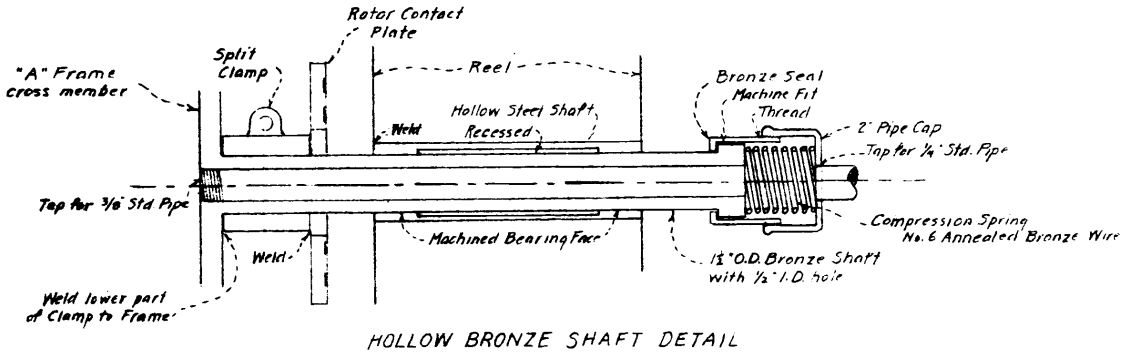


WIRING DIAGRAM

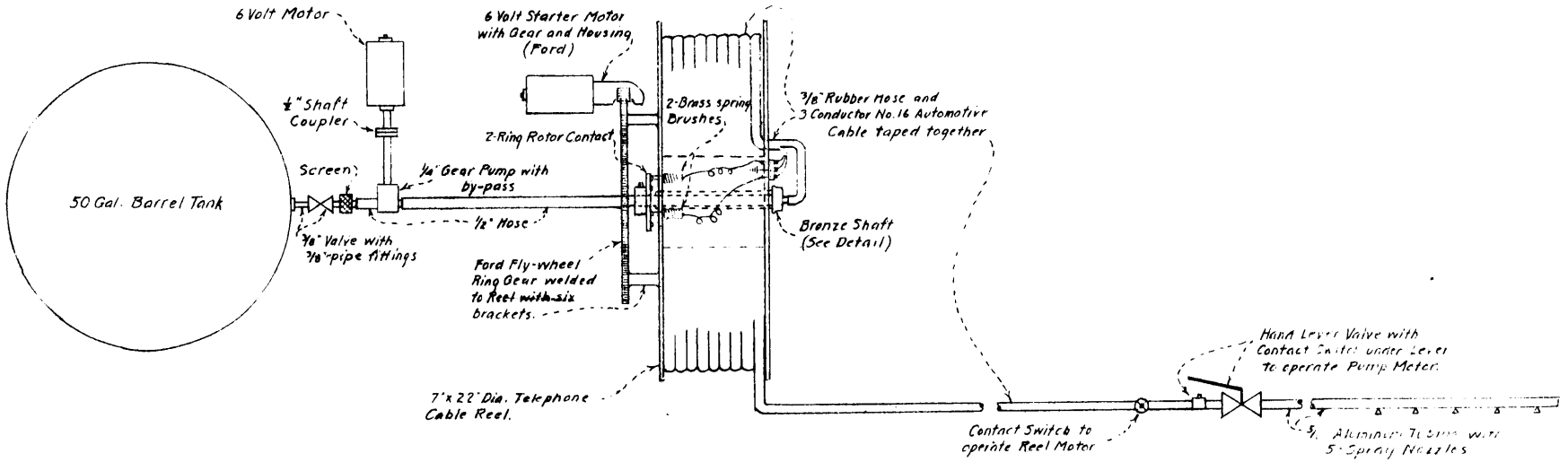
NOTE: For 150Ft. Hose - 12 volts are required to operate solenoid switches (Batteries No. 2 and 3.)
For 75 Ft. or less - 6 volts is sufficient to operate solenoid switches and Battery No. 3 could be omitted.

LEGEND

G - 6 Volt Generator in Truck
Battery No. 1 and 2 recharged by Truck Generator.
Battery No. 3 recharged in Shop
M - 6 Volt Automobile Starting Motors (Ford)
S - 6 Volt Automobile Solenoid Switch (Ford)
R - Rotor Contact (2-Rings) for transmission through reel and spray control.
—— 300 Amp. Battery Conductor Cable.
– – – No. 16 Automotive Conductor



HOLLOW BRONZE SHAFT DETAIL



WEIR POOL WEED SPRAYER

LIQUID GAS WEED BURNERS

In the past few years, an effective burning program for weed control has been put in operation on six projects in New Mexico and Texas, by Region 5 of the Bureau of Reclamation. This was brought about by the introduction and availability of liquid gas, particularly butane and propane. Although other methods of grass control on distribution systems are effective, burning still has a place in the routine weed control program. This is more applicable since liquid gas burners, mounted on both trucks and tractors, have been developed.

Several important and beneficial features have been incorporated into the burners used in Region 5, shown and described on the following pages. These features include:

(1) Vaporization of liquid at the burner,

(2) Swinging of booms so that the truck may traverse either bank of a canal, and,

(3) Cables or hydraulic means to raise and lower the burners so that they can be kept in the most effective burning position.

Vaporization of the liquid at the burners eliminates special heat exchangers which are dangerous, expensive, and burdensome. Many of the burners used on the equipment described were designed and fabricated on the several projects by project personnel. They may be mounted in clusters on the burner bars. The bars, usually, are mounted on black standard pipe which in turn telescopes over smaller pipe attached to the boom. The bars can be moved away from or pulled closer to the truck and can be raised or lowered hydraulically or by the use of cables, pullies, and cranks, generally by one man.

The burner heads for many of the burners were constructed of old boiler flues; however, the most durable are constructed of seamless steel tubing. A heat generating burner head is desirable and probably the most efficient; however, is not a necessity, as liquid gas will burn without producing much smoke, even when released through an open jet nozzle.

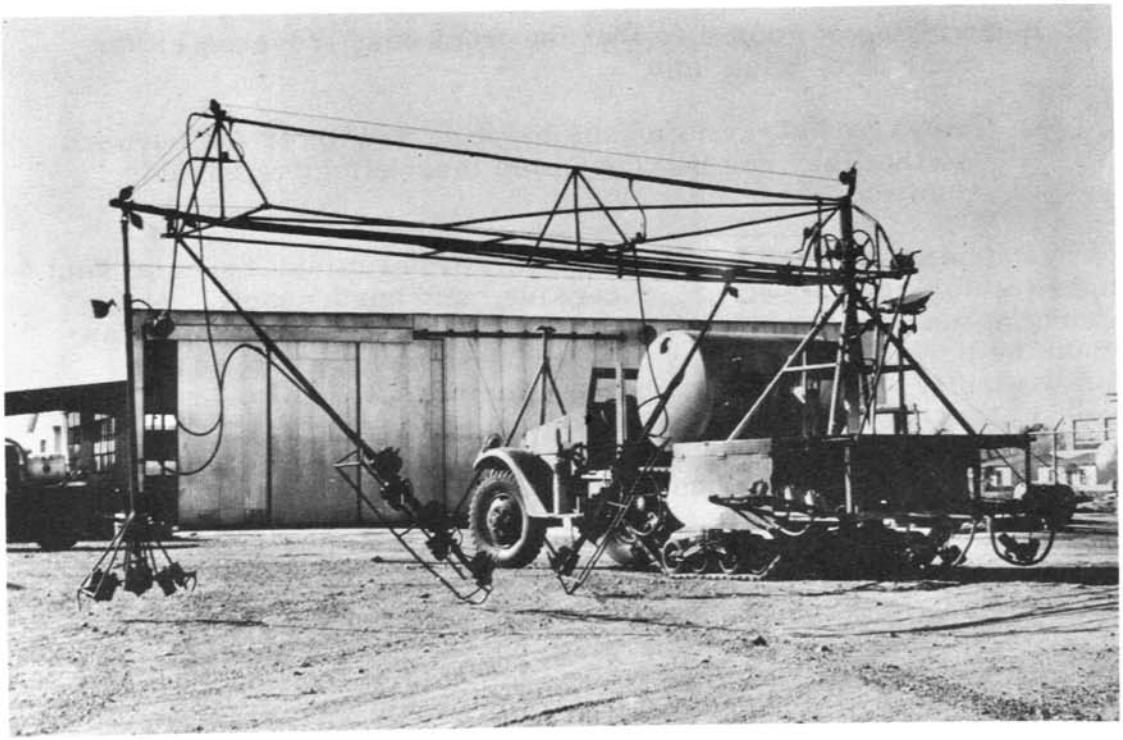
With a swinging boom, the truck can move on either bank of the canal while burning, the burners can be swung to the rear of the truck when burning the top of the canal bank, or the boom can be swung to a forward position when moving from one location to another. Burning weeds in a canal with an operating road on only one side is made more convenient and effective and wind conditions can be tolerated, by proper manipulation of the boom.

In order to burn canals having variable distances from the road bed to the water line, most of the burners shown have easily

adjustable burner bars, which can be controlled from the operator's seat and can be maintained in the proper burning position at all times.

Truck Mounted Burners

The butane weed burner shown on the cover of this issue of the Bulletin and in the photograph below is a little more elaborate than the usual burner of this type in use. The weed burner shown was constructed and is owned and operated by the Hood Petroleum Company, El Paso, Texas. The owner contracts with the Elephant Butte Irrigation District to burn weeds from ditches on a portion of the Bureau of Reclamation constructed Rio Grande Project. This arrangement has been in effect since 1949. The cost of burning with this and similar rigs has averaged about $17.00 per mile for one canal bank and $26.00 per mile where both banks have been burned.



There are differences in the design and construction of booms and mountings, which reflect the ideas of the several builders. The booms may be either manually or hydraulically controlled and are in general 25 to 30 feet in length. They are usually counter-balanced for ease of manipulation. The manually controlled boom, such as that shown at the top of the following page, is mounted on a turntable, which permits operations from one side of the truck to the other from the rear of the truck bed. The weeds in a small lateral are being burned by the truck mounted burner constructed in the shops of the Carlsbad Project, New Mexico, by project personnel. In this type of burning, the truck travels about 3 miles per hour.

Another burner that is very universal in operation, easily adjustable to meet unusual conditions and very mobile, is that shown below. This rig also was constructed by project personnel in the shops of the Tucumcari Project, New Mexico. It is completely hydraulically operated.

Hydraulic mechanism from an old pull grader was used for the controls on this machine. The operator sitting on the truck bed turns with the boom, which also is controlled hydraulically in its horizontal and vertical movement.

The burner consumes about 70 gallons of liquid propane fuel per hour under continuous operation. The truck ordinarily travels 1 to 3 miles per hour in the burning of green weeds and grasses, varying with

the height of the canope and the smoothness of the road, and travels 5 to 6 miles per hour when burning dry weeds in the ditches. A 400-gallon tank has been mounted across the truck frame and the liquid butane is piped from the tank to the burners. A high pressure regulator set at 50 pounds pressure is used to control the flow of butane to the burners.

The swinging boom is made of pipe and is mounted on a mast pipe. The mast pipe consists of two pieces of pipe, actually, with the smaller top pipe mast fitting inside the larger lower pipe. Roller bearings at the top and bottom of the mast pipe provide for easy movement. A support made also of pipe and mounted on the front bumper of the truck is provided for the boom to rest upon when travelling from one location to another, or when the rig is not in use.

Further information concerning this particular burning rig can be obtained by contacting the Project Manager, Rio Grande Project, 211 Federal Building, El Paso, Texas, or the Regional Director, U. S. Bureau of Reclamation, Amarillo, Texas.

Tractor Mounted Burners

Burners constructed on trucks, half-tracks or trailers, burn to the side and behind the carrier, while those that are tractor mounted, as shown below, burn to the side and in front of the transporting vehicle. The latter are used in Region 5 entirely for searing and burning green weeds and grasses.

A project shop-constructed, tractor-mounted liquid gas weed burner used on the Tucumcari Project, is shown at left. This burner consumes about 70 gallons of liquid gas per hour under continuous operation.

This machine operates at about 2 miles per hour when burning green weeds. Intense heat from the burning of dry weeds in front of the tractor and butane tank makes this machine impractical for winter cleanup. The boom of the burner on this rig is raised and lowered hydraulically and rotated with a mechanical screw device.

Another tractor mounted liquid gas weed burner is that shown at the top of the following page. This burner is used on the Fort Sumner Project, also in New Mexico. This burner also was constructed by project personnel in the project shops. It is completely hydraulically operated.

In operation on a project lateral, the burner head works to the side and front of the tractor, which makes it easily visible to the tractor operator. Like the previous tractor-mounted burner used on the Tucumcari Project, care is used in burning because of the proximity of the tractor and the butane tank.

Cost of Operation

Cost of operation varies from project to project and depends on the amount of liquid gas consumed per hour of operation and the number of burnings required to suppress the vegetation. Ordinarily, liquid gas weed burners operate on a tank pressure of about 100 p. s. i., and each burner head will consume 8 to 12 gallons of liquid gas per hour. The efficiency of liquid gas burners is considered very high as little smoke is evident.

On ditches heavily infested with weeds and grasses, two burnings are ordinarily recommended. The first burning being accomplished with the equipment moving at a rate of about 3 m. p. h. This searing results in an effective top kill even though there is little immediate change in plant appearance. The second burning, made about a week to 10 days later, consumes the old dead tops and retards any regrowth of new plants. By continuously burning and reburning when the green plants reach a height of 8 to 10 inches, weedy grasses and undesirable vegetation on the inside slopes of ditches have been successfully controlled.

A weed burning program has been employed on a part of the Rio Grande Project, Texas-New Mexico, for several years. In 1949 and 1950 five to six burnings were necessary to keep the Johnson grass suppressed to the extent it did not retard the flow of the water in the canals and laterals. Following the same procedure for Johnson grass control during the years, only four burnings were necessary in 1954, and it was indicated that only three burnings would be required in 1955.

In 1954, the average cost for burning green weeds on the inside of small ditches on the Carlsbad Project, averaged $8. 78 per mile per burning, and the cost of burning 35 miles of small ditches on the Balmorhea Project, Texas, averaged $7. 80 per mile of burning.

For further information concerning the weed burners in use in Region 5, contact the Regional Director, U. S. Bureau of Reclamation, Amarillo, Texas. By way of general information, commercial manufacturers of liquid gas weed burners in the Region 5 area are:

Bazooka Burners, Box 5211, Amarillo, Texas
Snorkel Jet, 4110 N.E. 8th, Amarillo, Texas
Agricultural Equipment Corporation, La Junta, Colorado.

* * * * *

COLUMBIA BASIN TRASHRACK

The trashrack shown in the photograph below is of the type presently being installed on laterals in the West Canal area of the Columbia Basin Project, Washington. The flat slope of the rack aids in the removal of weeds and the landing mat deck provides good footing. The trashrack shown was installed in a lateral having a capacity of 400 cfs.

Construction:

Surplus rails are used for the supporting cross members and pipe for the rack varies from 3/4- to 1-1/4-inch heavy duty, depending on the length of span. The rack shown was constructed of 1-1/4-inch pipe with the longest pipe length being about 20 feet.

The pipe is spaced 8-inch center to center and placed on a slope no steeper than 4:1. Upper ends of the pipes are loosely attached to the rail by large spikes which pass through holes in the ends of the pipes and through the web of the rail. The foundation for the rail cross member can be of concrete or serviceable timber. The

platform required in large laterals, as shown in the photograph, has a deck constructed from surplus landing mat supported by a pipe framework.

In many cases the complete unit is fabricated in the project shop and is rigidly constructed, using pipe or heavy strap around the outside perimeter of the rack. A fence enclosure is constructed adjacent to large installations for deposit and burning of weeds collected.

* * * * *

ORCHARD MESA WEED CUTTER

The weed cutter shown in the photograph below was built in the shops of the Orchard Mesa Irrigation District, Orchard Mesa Division of the Grand Valley Project, Colorado. Used to control water weeds and remove silt deposits in the District's canals, it is reported to be very effective in accomplishing the job for which designed and can clean approximately 52 miles of canal in a week. The device is only operated when there is water in the canal; thus the water carries the dislodged material to the end of the canal where it can be removed.

Construction Details:

The point of the "A" frame is constructed from grader blades which are about 6 inches high and 2 feet long, forming a "V" and reinforced with iron braces and a post. The side wings of the frame also are constructed from grader blades and are about 4 inches high and 11 feet long with the end of the wings having an upsweep of approximately 2 feet. They are attached to the post by heavy iron hinges.

The cross bar is constructed from two pieces of 2-inch pipe, 2-1/2 feet long, each being attached to the side wings. Inside the 2-inch pipe is a 6-foot length of 1-1/2-inch pipe, all three sections of pipe having vertical 1/4-inch holes drilled through them. The pipe sections are secured with steel pins. The pins can be removed, allowing the side wings to be adjusted to the desired width.

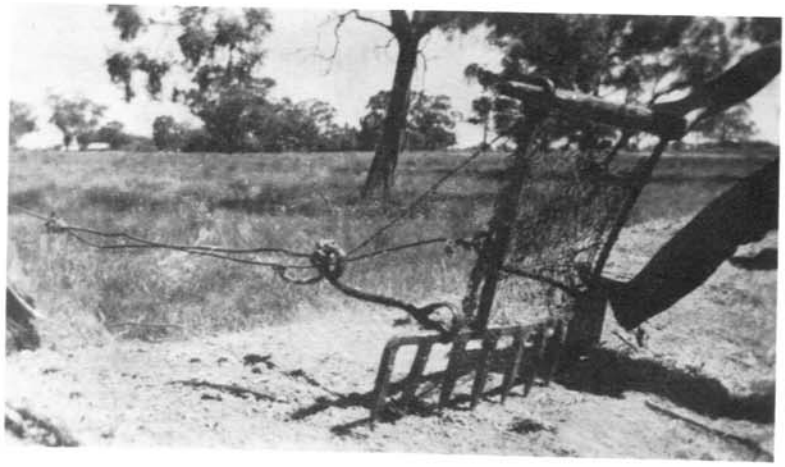
Short sections of rail coupled with chain links are attached to the end of the side wings to form a U-shaped drag behind the frame. The drag aids in dislodging moss and silt.

The "A" frame is pulled by a tractor. It is attached to the tractor by a 12-foot side drawbar, shown in the photographs. A heavy chain is attached to the dozer blade of the tractor and the post of the "A" frame. This tends to keep the "A" frame in the bottom of the canal.

* * * * *

CHINESE RAKE

A device used for control of weeds in irrigation channels and drains in Australia, is the Chinese Rake shown below. The rake was developed by the State Rivers and Water Supply Commission. In the lower photograph on this page, water couch grass, distichum, or silt grass, which is a vigorous growing, creeping perennial, has completely choked a drain, and is being removed with the rake.



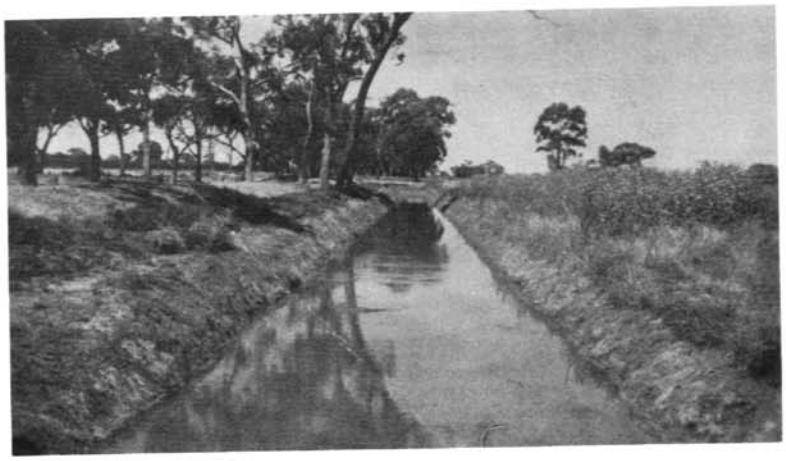
The photograph on the following page is a view of the channel after it has been cleaned with the rake.

The photographs and a drawing of the rake were supplied by the State Rivers and Water Supply Commission, Victoria, Australia. Use of the rake is described in the Commission's Technical Bulletin No. 5, Weed Control in Irrigation Channels and Drains, June 1953. The bulletin is a progress report and summary of mechanical and chemical experiments made by the Commission in a study of methods to control various types of weeds and plant growth causing considerable difficulty in the operation and maintenance of their irrigation systems.

Construction Details:

The rake is constructed primarily of pipe and steel. Two rakes of similar design have been used. The larger rake has an overall width of 6 feet 5-1/2 inches and a height of 3 feet 4 inches. The smaller rake has an overall width of 4 feet 3 inches and a height of 2 feet 9 inches.

Four horses and three men are required to manipulate the larger rake and two horses and two men the smaller.



A drawing of the large and small rakes is given on the following page, together with a bill of materials.

The rakes are of welded construction, and the smaller one has been provided with a back plate to protect the operator of the rake.

In the photograph of the rake on the previous page, a wire screen has been placed on the rake uprights to protect the operator.

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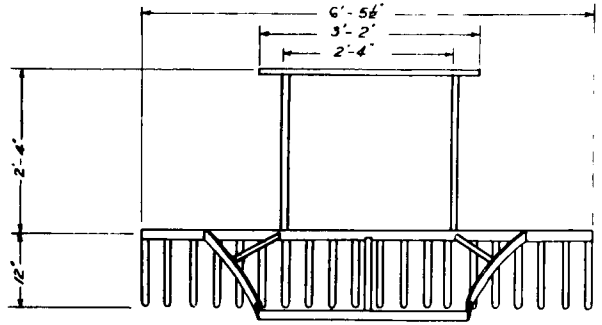
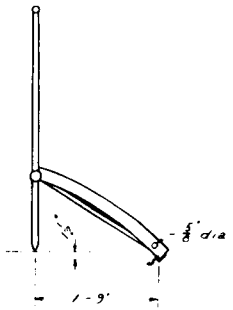
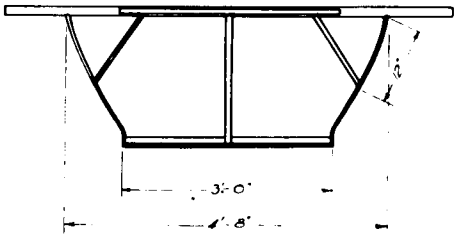




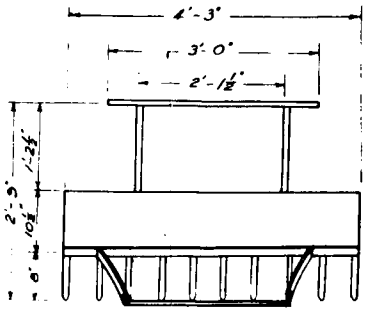


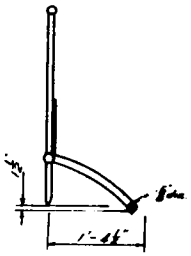
LARGE RAKE

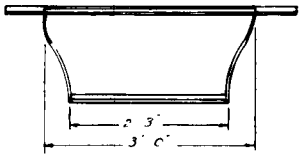
Horses Pulling 3
Horse Retrieving 1
Total Horses 4
Three Horse Driver 1
Rakeman 1
Leader Retrieving Horse 1
Total Men . . 3

MATERIALS

Item	Material	Size	Quantity
Handle	1" R M S	3' 2"	1
Standards	1" R M S	2' 3"	2
Rake Bar	1½" R M S	6' 6½"	1
Tynes	1" R M S	11"	20
Drawbars	2"x½" M S	2' 3"	2
Centre Strut	1" R M S	2' 2"	1
Side Strut	1" R M S	1' 3"	2
Fulcrum Skid	1½"x1½"x¼" Angle	3' 0"	1
Shackels	Black Iron	3"x½"x½"	4
Chain Plough	Black Iron	2' 36" long	2
Ring	Iron ½"	3" dia	1
Rope, Wire	Gal Steel ⅜"	30"	2
Swingle Bars		3 horse set	1
Swingle Bar		1 horse set	1
Thimbles	Gal. Steel	⅜"	4
Wire Rope Clips		⅜"	8







SMALL RAKE

Horses 2
Men, driver & rakeman . . 2

MATERIALS

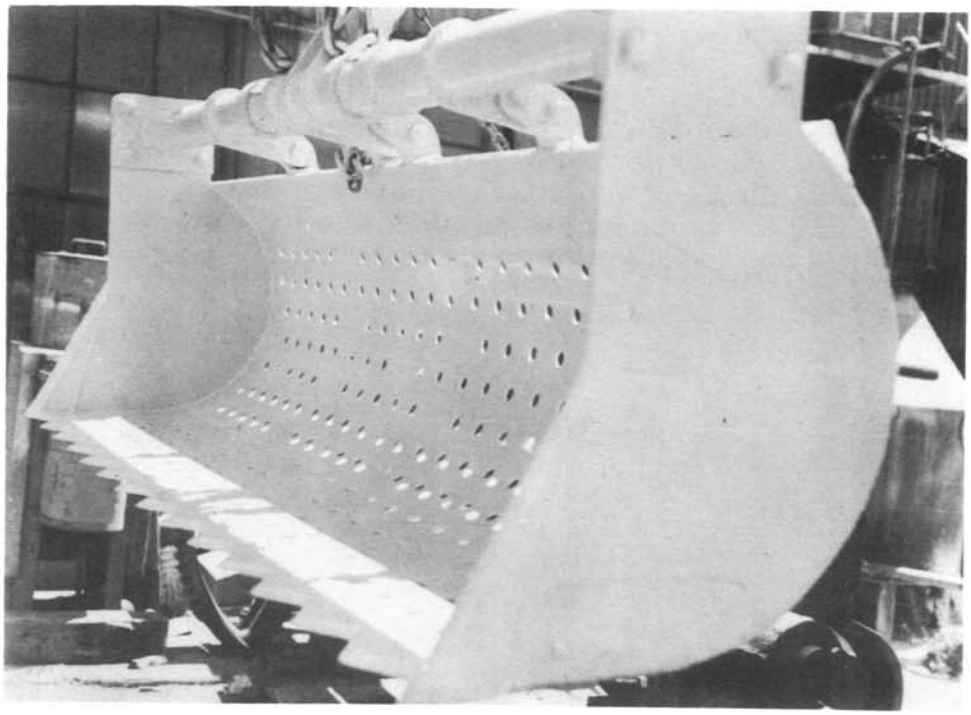
Item	Material	Size	Quantity
Handle	1" dia G W I Pipe	3' 0"	1
Standards	1" R M S	2' 0"	2
Rake bar	1" R M S	4' 3"	1
Tynes	1" R M S	8"	10
Draw Bars	2"x½" M S	1' 10"	2
Fulcrum Skid	1½"x1½"x¼" Angle	2' 3"	1
Mack Plate	⅜" M S Sheet	4" 3" x 1'-2½"	1
Chain With Eye	2'	48"	1
Rope, Wire	Gal Steel ⅜"	30"	1
Shackles	Black Iron	3"x1½"x½"	2
Thimbles	Gal Steel	⅜"	2
Wire Rope Clips		⅜"	4

STATE RIVERS & WATER SUPPLY COMMISSION
MAFFRA - SALE IRRIGATION DISTRICT

CHINESE RAKE

DEMOSSING BUCKET FOR GRADALL EXCAVATOR

A bucket was fabricated in the shops of the Salt River Valley Water Users Association in Phoenix, Arizona, for use with the Association's fleet of Gradall excavators in expediting and facilitating the removal of moss from the canals and laterals of the irrigation system.



Construction details:

The bucket is shaped much like the 60-inch ditch cleaning bucket supplied by the manufacturer. However, the Salt River bucket is 72 inches wide, has a serrated cutting edge, and the bucket plate has been perforated, as it is normally used under water.

The unit is shown in operation in the photograph at left. A large amount of moss and silt can be removed with each pass of the bucket, demossing about one mile of ditch per day.

Cleaning of the canal or lateral while demossing also eliminates an additional pass through the ditch by hand crews at a later date.

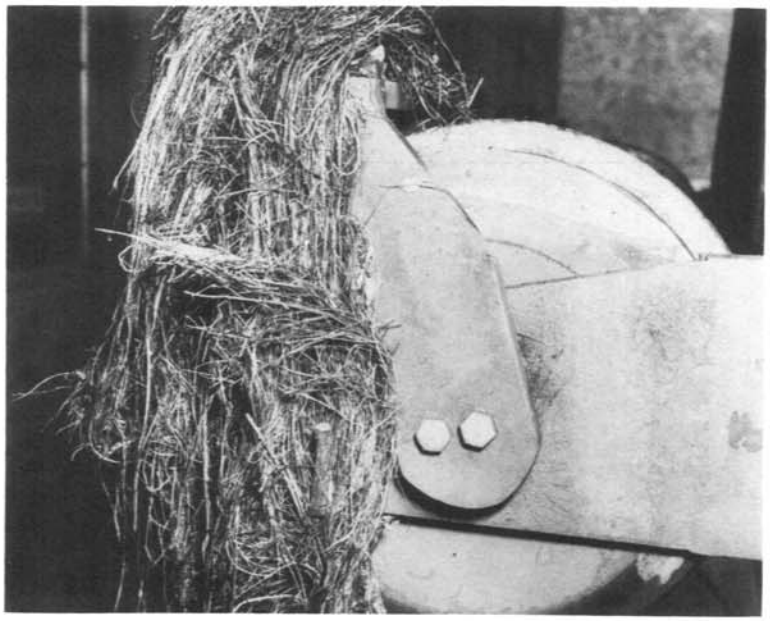
Cost:

On the Salt River Project, maintenance of the canal system is complicated by the proximity of many growing residential areas. Limited right-of-way, the presence of overhead power and telephone lines, and other residential problems made the Gradall ideally suited for the work. Demossing on the project by the use of the bucket is done for approximately $68.00 per mile. This is about one-half the cost of the conventional chaining and discing operation previously used, which involved catching the moss on grates placed in the waterway being cleaned and then hand forking the moss from the grates.

* * * * *

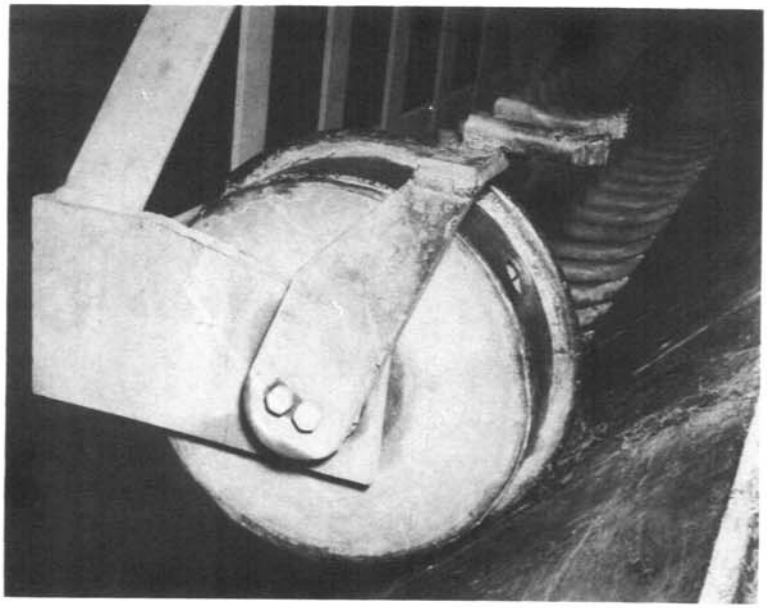
TRASHRACK RAKE

The debris that collects on the trashrack of the Wellton-Mohawk Pumping Plant No. 1 of the Gila Project, Arizona, consists largely of pondweed, as shown in the photograph below. A mechanical rake was provided for clearing the debris from the trashrack; however, in operation, difficulty was encountered in using the rake, due to the type of debris. It collected on the trashrack and interwove into a homogeneous compact mass, forcing the wheels of the rake to ride over it. This in turn lifted the rake away from the trash bars.

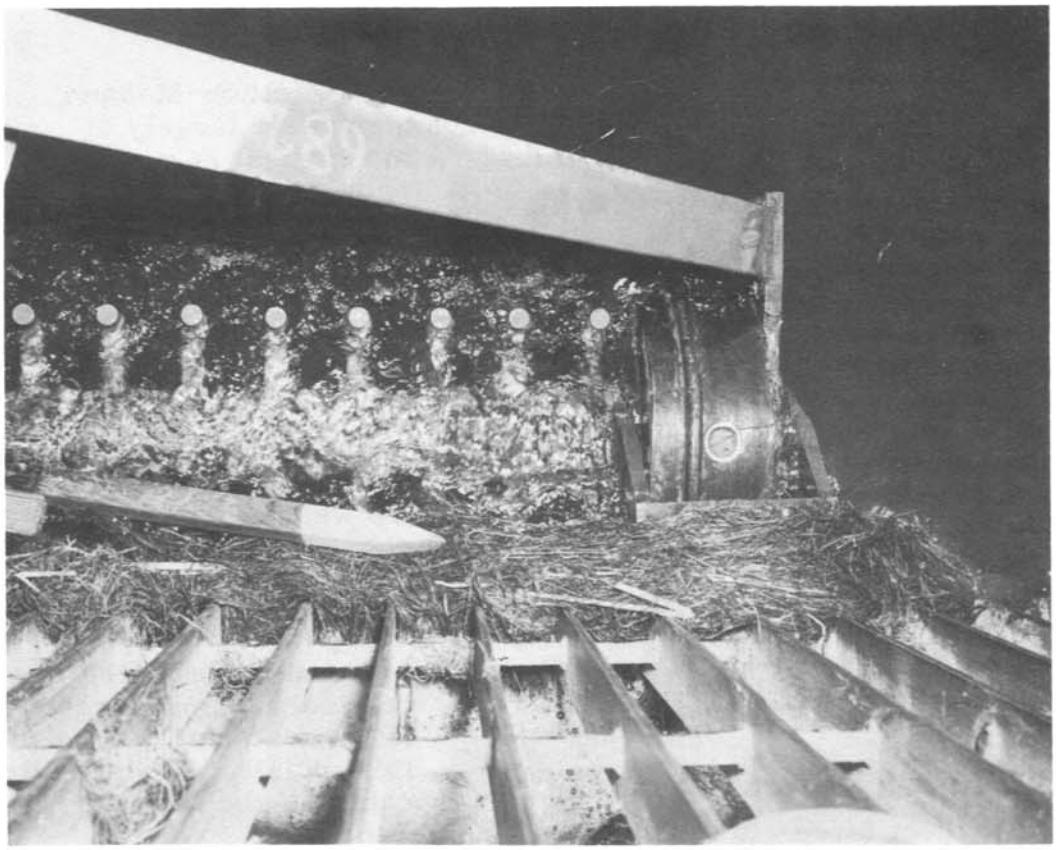


A drawing of the original trashrack rake is presented at the end of this article. The modification of the rake devised by the project forces is shown in the photograph below.

The modification consisted of a set of rake teeth or plows mounted just ahead of the wheels. The teeth clear a path through the debris so that the wheels are permitted to roll on the surface of the rack as designed, successfully removing the entwined mass.



Several rakes of the type installed on the Gila Project have been installed on other Bureau of Reclamation projects. The type of debris appears to have a bearing on the success of the rake in clearing trashracks. As now modified, the Gila Project is well satisfied with the rake in handling the debris, principally pondweed and moss encountered in the canal system. A view of the rake in operation is shown in the photograph at the top of the next page.



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IIB10
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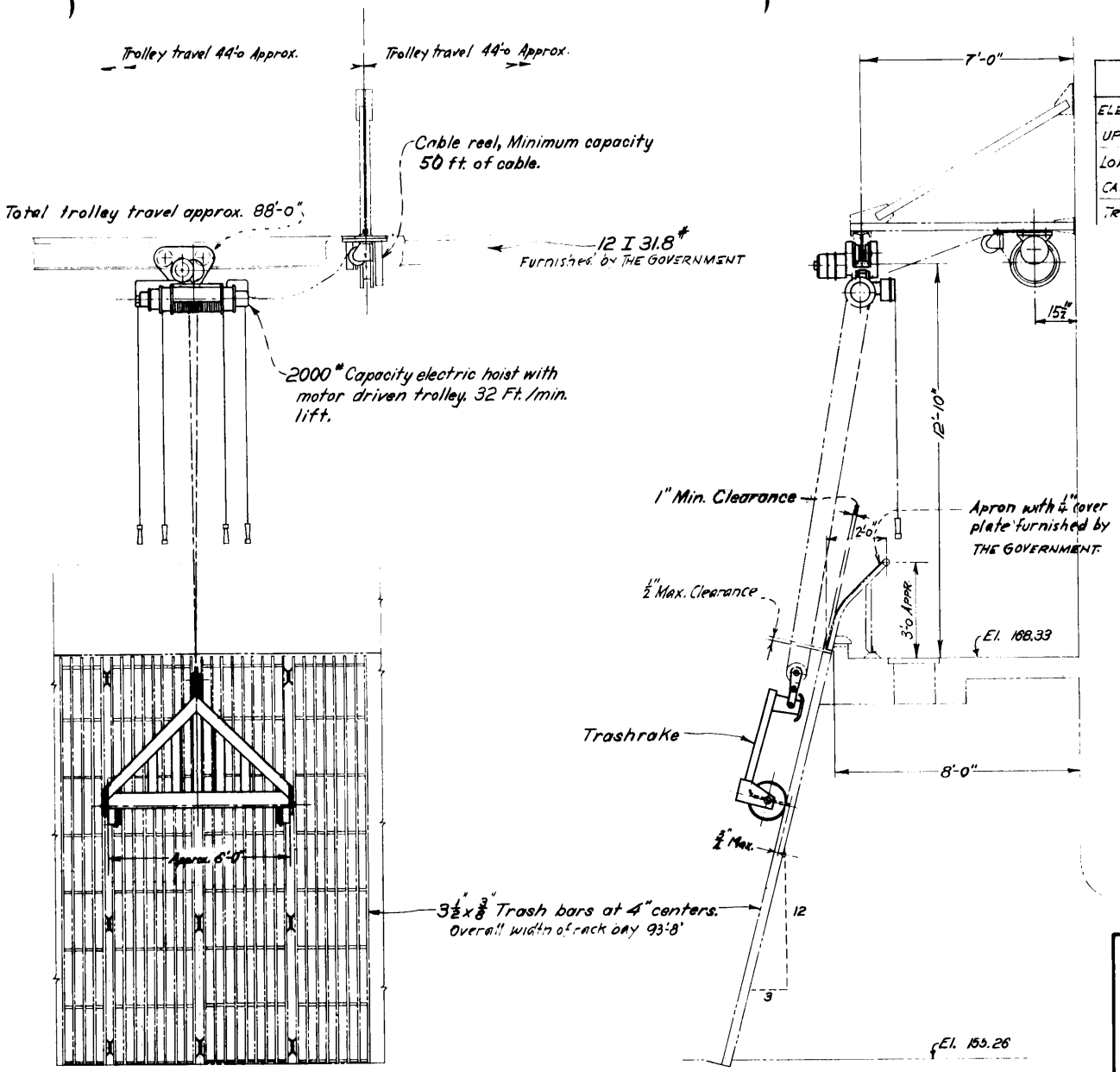


LIST OF EQUIPMENT

DESCRIPTION	NUMBER REQ'D.
ELECTRIC HOIST WITH MOTOR DRIVEN TROLLEY 2000# C.A.P.	1
UPPER LIMIT SWITCH	1
LOWER LIMIT SWITCH	1
CABLE REEL WITH 60'-0 OF CABLE	1
TRASH RAKE APPROX. 6'-0" WIDE.	1

REFERENCE DRAWINGS

GENERAL ARRANGEMENT-BUILDING & EQUIPMENT	50-D-2328
TRASHRACKS	50-D-2344
TRASHRAKE METALWORK	50-D-2345

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
GILA PROJECT-ARIZONA
WELLTON-MOHAWK DIVISION

WELLTON MOHAWK PUMPING PLANT NO. 1. TRASHRAKE AND HOIST INSTALLATION

DRAWN C.R.W. SUBMITTED
TRACED RECOMMENDED
CHECKED W.O. APPROVED
CHIEF DESIGNING ENGINEER

REV. 11-15-49 W.O.

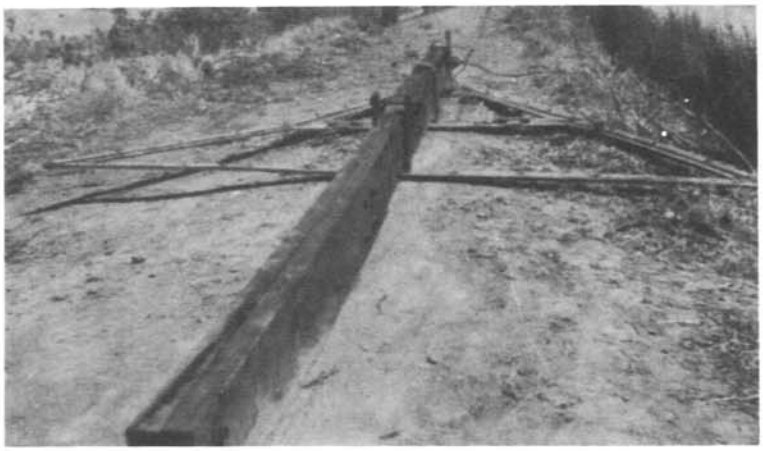
DENVER, COLORADO, AUGUST 24, 1949

50-D-2594

BROAD ARROW WEED CUTTER

Control of aquatic weeds in irrigation and drainage channels is one of the major problems confronting irrigation authorities of the State Rivers and Water Supply Commission, Victoria, Australia. Chemical control and burning with flame throwers have been tried, but removal of weeds by manual labor has been common practice. Dredging with a dragline and bucket has also been used but this procedure alters the characteristics of the channel and leaves a ridge of spoil on the banks for disposal. Other mechanical means have been tried but all tend to alter the shape and depth of channels.

The broad arrow weed cutter, shown below, was developed by Mr. R. I. Walsh, A.M.I.E.Aust. Information extracted from the official supplement to the Commission's staff magazine "Spillway", was published in "The Commonwealth Engineer", June 1948. The weed cutter was considered a considerable improvement over the then existing methods used in removing weeds and appeared the only implement that did not damage or alter the shape of the channel in operation.



Cutting can be carried out on either up or down stream runs. The blades have a slicing action as they move forward and will cut any weed. The cutter sinks just slightly below the bed of the channel and the cut is generally just under the surface of the silt through the root system of the weeds. The result of cutting the weeds so low is that many of them will not grow again.

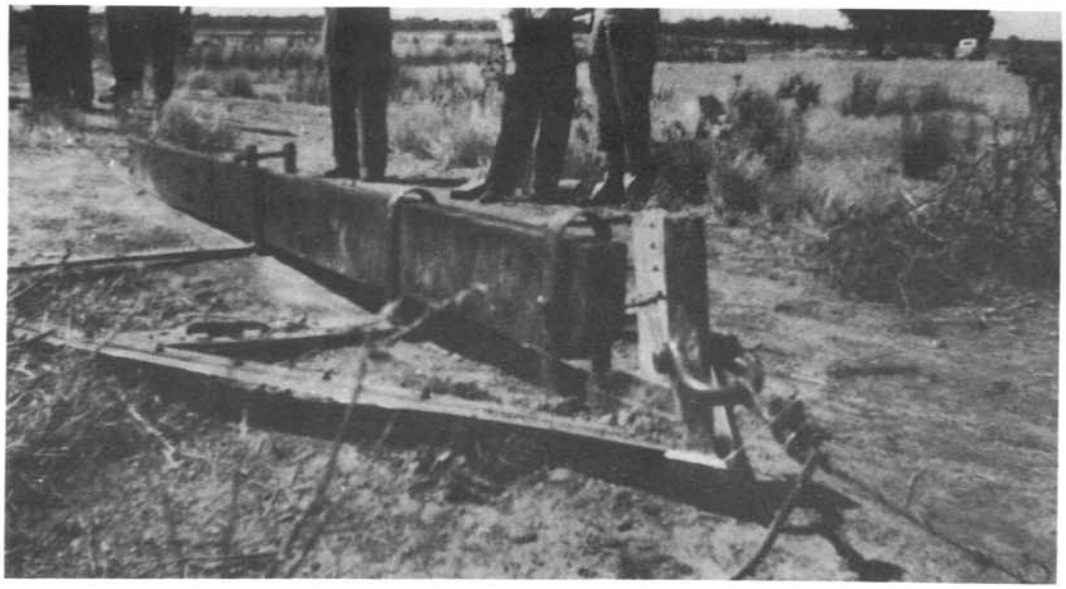
Using the 10-foot cutter shown above, one trip up and one down is required to clear a 16-foot channel. Removing the cut weeds from the canal by hand labor requires about 12 men. It is estimated that about 4 to 5 miles of channel per day can be cleaned. In the photograph at left, a portion of the weeds cut during a 20-minute run are

being forked from the channel where they have collected against a bridge. In channels from which the weeds have been cut with the broad-arrow cutter, it has been necessary to recut the weeds only once every six weeks as compared with once every two weeks when cut by hand methods.

In the photograph at left, a four horse team, two on either bank, is pulling the 10-foot weed cutter along a channel. Note the turbulence on the left bank following in the wake of the cutter working on that side.

Construction Details:

The implement as the name implies is shaped like an arrow and is constructed in three parts:- the arrow-head or 5-foot cutter, the training or 10-foot cutter and the rudder. A pulling attachment is fixed to the arrow-head for hitching the tow rope.



Flush welded construction is adopted for the arrow-head or 5-foot cutter, 4- by 1/2-inch flat mild steel being used. This forms a 5-foot equilateral triangle, with 4-inch bearing surface on the three sides. A triangular hardened-steel nose piece is welded to the apex and is bevelled 1 inch to a knife edge. Also, flush welded to the main frame is a 4- by 1/2-inch cross member to take the rudder bracket and pulling attachment.

In the center of the base a rudder guide is welded. This is

the center guide for the 10-foot cutter and rear guide for the 5-foot cutter. In addition, on this member are welded the female components of the butt hinges for attaching the trailing cutter.

Cutting blades 5 feet in length and manufactured from 5-1/4- by 1/16-inch saw steel are bevelled to a knife edge and sharpened. The blades are attached to the frame by a cover piece of 3- by 1/4-inch mild steel bolted through with 3/8-inch counter-sunk bolts, spaced at 16-inch centers. The cutting edge of the blades protrudes 1-1/2 inches over the base.

Formed on a base of 4- by 3/4-inch mild steel, the trailing or 10-foot cutter has its four members flush welded at the corners. The front member carries the male components of the butt hinges and the rear member of the rear rudder guide for the 10-foot cut. Blades similar to those on the arrow-head are attached in the same manner.

A pulling attachment, profiled from 1/2-inch mild steel plate, is welded to the main frame and cross member of the arrow-head. This is "L" shaped, the vertical leg having three 1-inch holes for the adjustment of the shackle to allow for the varying angle of pull. To this shackle is attached a single wire rope, 4 feet 6 inches long with a ring on the outer end for connecting the towing ropes.

Design of the rudder follows modern timber practice. The material used in Australia was laminated hardwood, heavy red gum being used for the pilot model. Two lengths of rudder are required:- 12 feet for the 5-foot cut and 16 feet for the 10-foot cut; therefore, the laminations are of varying lengths. On one side there is a 12-foot length and a 4-foot length and on the other side a 9-foot 6-inch and a 6-foot 6-inch length. When the 12-foot rudder is required the 9-foot 6-inch and the 4-foot laminations are removed and a 5-foot 6-inch filling piece is fitted. Each lamination is 2 inches in thickness and 9 inches in width, making the full section 9 inches by 4 inches. However, the front end is reduced to 6 inches back to the center guide and cut away to 7 inches at the rear guide to allow for a slight vertical movement so as not to disturb the horizontal alignment of the cutter, the front end being pivoted. The laminations are bolted together with 1-inch bolts; bolt heads and nuts are recessed making the rudder sides flush so that there is nothing to catch in the weeds to cause undue drag.

Formed from 4- by 1/2-inch mild steel, the front bracket and the center guide are of "U" shape, with the rear guide in two "L" shaped parts, a bolt being fitted across the top to allow for withdrawing the rudder for transportation.

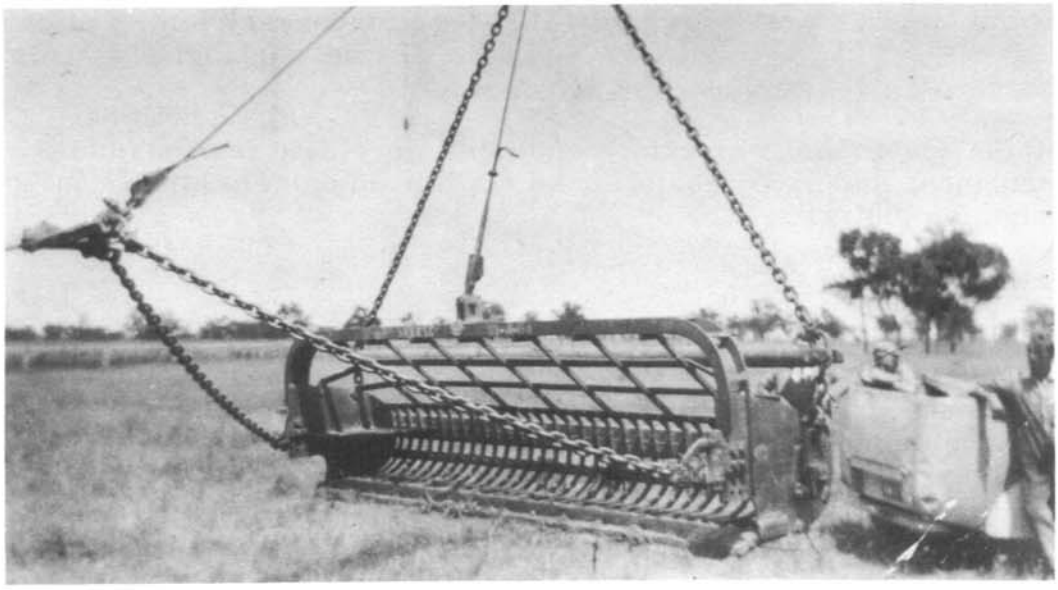
The implement can be broken down into sections light enough for two men to handle and can be easily transported. The longest length is the 12-foot section of the rudder and the greatest width, the arrow-head cutter, approximately 5 feet.

* * * * *

NEW ZEALAND WEED BUCKET

One of the major problems in the irrigation districts of Victoria, Australia, is the maintenance of the drainage channel systems. The persistent growth of weeds seriously affects the capacity and efficiency of the drains, and previously, although a great many control methods have been tried, a reasonably satisfactory means of dealing with the problem had not been obtained.

The Hon. H. E. Bolte, M.L.A., who was then Minister of Water Supply in Victoria, was in New Zealand during the early part of 1950. He was very much impressed with the performance of the implement shown below, used on weed control work by the North Canterbury Catchment Board. As a result of the Minister's inspection, the Commission immediately placed an order for two of the implements, which are popularly referred to as "New Zealand Weed Buckets".



The weed buckets purchased, one 8 feet in width and the other 10 feet in width, were evolved by Mr. W. H. Harris, then Chief Engineer of the Catchment Board, and manufactured under patent by Messrs. Sinclair, Melbourne & Co., Lyttleton, New Zealand. They were tested under the most severe conditions.

Although the 10-foot bucket has been successfully tested, the 8-foot bucket was considered the best suited to the needs. The 8-foot bucket, attached to a 3/8-cubic yard dragline, was engaged in cleaning a drain which had a bed width of up to 10 feet and from 3 to 4 feet in depth.

The weeds dealt with can be classified into three groups in order of infestation, viz., Pondweed and Ribbonweed; medium to light Cumbungi with Pondweed; and heavy Cumbungi. Depending on the type of weed infestation, the lengths of channel which may be cleaned daily are

in the order of 1,800, 1,300, and 800 feet respectively, or approximately 7, 5, and 3 times the lengths normally cleaned at the same daily cost by the excavator using a standard bucket.

The weed bucket, shown in use in the photograph at left, has an advantage over the standard bucket also in that it removes, roots and all, without enlarging or upsetting the designed bed width of the drain. As with the standard bucket, however, a certain amount of water is necessary for its effective working.

Others who have inspected the bucket under working conditions were also impressed by its performance, and have requisitioned similar equipment for use in other irrigation districts.

Construction Details:

Manufactured under patent, the 8-foot bucket is 18 inches high and 21 inches deep. Its weight is approximately 1,060 pounds and is used successfully on a 3/8-cubic yard dragline. The bucket consists of a cutting blade on the base, with reversible edges, one edge being straight and the other curved from the base to the top and is latticed to enable silt and water to drop through.

The 10-foot bucket, which is the one shown in the photographs, is similar in design, but is 30 inches high and 2 feet deep. It weighs 1,740 pounds and is too heavy for use on a 3/8-cubic yard dragline, but is very suitable for a 1/2-cubic yard machine. The 10-foot bucket, as shown in the above photograph, was used for cleaning approximately 1,300 feet of cattail infested drainage channel in a day, with the bucket attached to a 1/2-cubic yard dragline.

* * * * *

KERR GRASS DRILL

The Kerr Grass Drill shown below is used in the Bureau of Reclamation's Region 5, New Mexico and Texas, for seeding grasses along canals and on reservoir areas. The photograph is a general view of the drill in operation seeding grasses on the McMillan Reservoir area, on the Carlsbad Project in New Mexico.

Construction Details:

This particular drill has separate seed containers for each drill furrow, which is of advantage when using the seeder on a steep slope. Also separate containers are provided on the seeder for the large, fluffy seed (Western wheat grass, grama, etc.) and the small hard seed (Bermuda, Love grass, etc.). Regulators are installed on the seven discs to regulate depth of seeding, and a conventional car transmission is incorporated into the construction of the drill to facilitate changing seeding rates.

The drill shown was purchased from the Kerr Manufacturing Co., Geary, Oklahoma, for approximately $650. For further information write the manufacturer or the Regional Director, U. S. Bureau of Reclamation, Amarillo, Texas.

* * * * *

"SEED EASY" BROADCAST SEEDER

The "Seed Easy" broadcast seeder shown below and manufactured by Garber Power Seeders, Inc., St. Paris, Ohio, has been a big help in the spoil bank seeding program along canals on the Bureau of Reclamation's Central Valley Project. Use of the seeder has resulted in completing the job faster and at less cost. Compared with previous seeding methods and costs, there was a saving of $600 to $800 in the broadcasting of 50,000 pounds of seed.

The seeder performs very efficiently and with the exception of seeding by helicopter, it is the fastest method used on the project for seeding large spoil banks and ditch-bank areas. The seeder has been borrowed on several occasions by other public agencies who also have found it to be fast and efficient.

First used on the Delta-Mendota Canal, a similar seeder was purchased later for use on the Friant-Kern Canal also a part of the Central Valley Project. For seeding slopes the seeder is used on the left side of the pick-up truck as shown. For seeding larger areas, the seeder is mounted over the tail gate. It is mounted on a platform designed to fit in the bed of a pick-up truck, so that the broadcaster hangs over the side or end of the truck bed. The operator on the pickup controls the speed of the seeder engine so that the seed is broadcast 10 to 50 feet onto the spoil banks. On level ground the truck travels 8 to 10 miles per hour.

The photograph above and on the following pages does not show

the attachment for handling small seeds, but such an attachment is furnished with the seeder. By using the grass seeding attachment, both large and small seeds or two different kinds of seeds can be planted at the same time without mixing prior to seeding.

The seeder has a built-in metering device so that the adjusted density of the broadcast seed is uniform, whether the fans are throwing seed 10 feet or 40 feet.

Construction Details:

The seeder used on the canal banks of the Central Valley Project was the Garber "Seed Easy", Model GM. A platform, large enough to fill the entire pickup truck bed, was secured to the bed. The platform should be sufficiently high to permit the seeder to rest on the platform and on the side or tail gate of the truck bed. The seeder was attached to the platform by two bolts on the back side and two clamps, which are furnished with the machine.

Some modifications were made to the seeder on the project, which improved its operation and the results obtained. These modifications were:

(a) The addition of a hand throttle to control the speed of the fans, rather than use of the engine governor for this purpose.

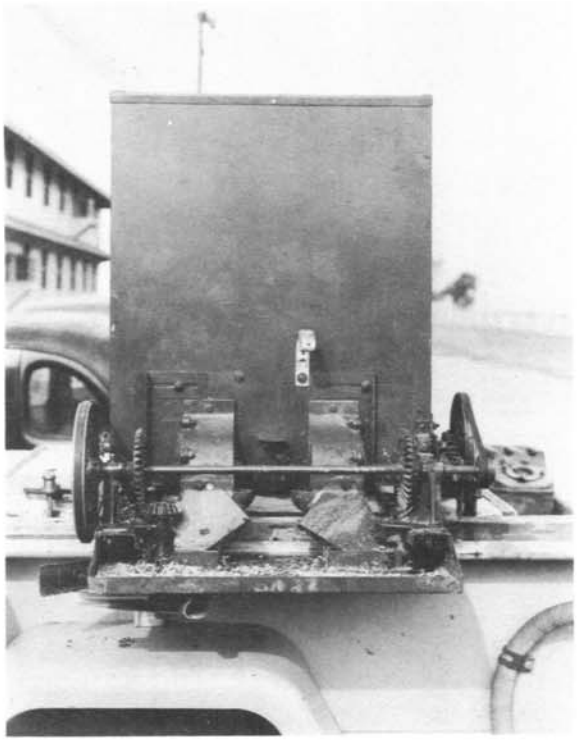
(b) The seed reflector behind one fan was extended approximately 8 inches to the outside so that all the seed cleared the truck bed.

(c) Bushings were placed behind the gears operating the fans so that the gears had a closer fit and ran smoother at high speeds.

(d) The engine pulley was replaced with a smaller one. A 1-1/2-inch pulley was found best.

It was discovered that by closing one aperture and disconnecting the broadcaster from the same side, the opposite broadcaster

would then throw sufficient seed a greater distance (when needed) than when both broadcasters were operating. One fan was sufficient to distribute seed with the seeder mounted on the side of the truck; however, for larger areas with the seeder mounted on the tail gate the two fans were used. The second fan can be removed by loosening one set screw from the gear on the fan shaft, shown in the photograph at left.



Except for the above and keeping the gears well coated with a heavy gear grease to reduce wear, the project forces found no need to improve upon the seeder as furnished.

The seeder cost approximately $150, complete with engine and grass-seeding attachment. The one first used on the Central Valley Project was purchased from the H. C. Shaw Company, Stockton, California. Further information regarding the seeder, its present cost and its operation may be obtained from the manufacturer, dealers, or the Bureau of Reclamation. To contact the latter, write Regional Director, U. S. Bureau of Reclamation, Sacramento, California, Attention: Code 2-440.

* * * * *

WEED SPRAY HOSE

A spray hose that is oil resistant and that has proved to be very successful for use on spray equipment, is the B. F. Goodrich "Weed Spray" hose. Designed for conducting weed-killing solutions such as DDT, 2-4D, etc., and for low pressure insecticidal and fungicidal spraying of shrubs, bushes, trees, etc., for the control of pests and disease, the hose has given good service.

The hose is supplied in 500-foot reels or in specified lengths. It is of braided construction with high tensile strength rayon cord. It can be supplied in internal diameters of 3/8- and 1/2-inch, which will have external diameters of 11/16- and 27/32-inch, respectively. Maximum working pressure is given as 200 pounds, with the weight per foot of the 3/8-inch ID hose being 0.158 and that of the 1/2-inch 0.237.

The hose has a semi-glossy, black, smooth rubber cover.

B.F.Goodrich Spray Hose

Tubes will not flake or clog spray guns

Paint spray hose

Recommended uses: For conducting paints, lacquers, varnishes, varnish thinners, synthetic enamels, oils, gasoline, kerosene and fuel oil.

Cover: Semi-glossy, black, smooth, oil-proof rubber. Resists solvents, sun-checking.

Reinforcement: Braided construction. High tensile strength rayon cord.

Tube: Light gray — will not flake or clog gun. New improved; resists discoloration from paint, solvent, gasoline and oil.

Length: Supplied in 500 ft reels or specified lengths.

Couplings: Barbed inserts or special reattachable fittings, as specified by customer.

Paint spray hose specifications

Size (ID)	Braid	OD	Wt lb per ft	Max work pressure lbs
1/4"	1	1/2"	.10	150
1/4"	2	5/8"	.17	225
5/16"	1	21/32"	.14	150
5/16"	1	11/16"	.18	150
3/8"	2	11/16"	.16	200
1/2"	2	7/8"	.24	150

Replaces Catalog Section 4470 Issued 10-1-52

Weed spray hose

Recommended uses: Ideal for weed killing solutions of all types, and low pressure insecticidal and fungicidal spraying of shrubs, bushes, trees, etc.

Cover: Semi-glossy, black, smooth rubber. Resists oil, abrasion, sun-checking and aging.

Reinforcement: Braided construction. High tensile strength rayon cord.

Tube: Will not flake or clog nozzle. Resists solvents, oils and aromatic carrier used in common weed-killing solutions. Oil-resistant.

Length: Supplied in 500 ft reels or specified lengths.

Couplings: As specified by customer.

Weed spray hose specifications

Size (ID)	Braid	OD	Wt lb per ft	Max work pressure lbs
3/8"	1	11/16"	.158	200
1/2"	1	27/32"	.237	200

Printed in U.S.A. 7-54

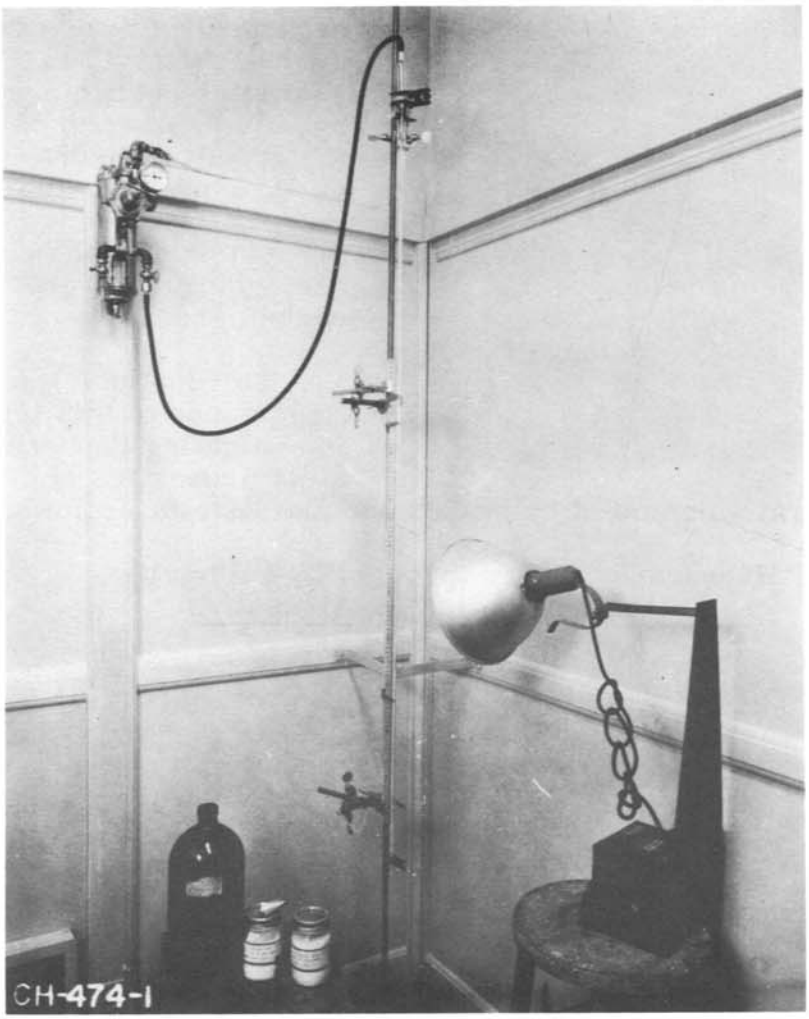
Paint — air — oil hose

Weed spray hose

NEW METHOD FOR ANALYZING HYDROCARBON TYPE AQUATIC WEED KILLERS

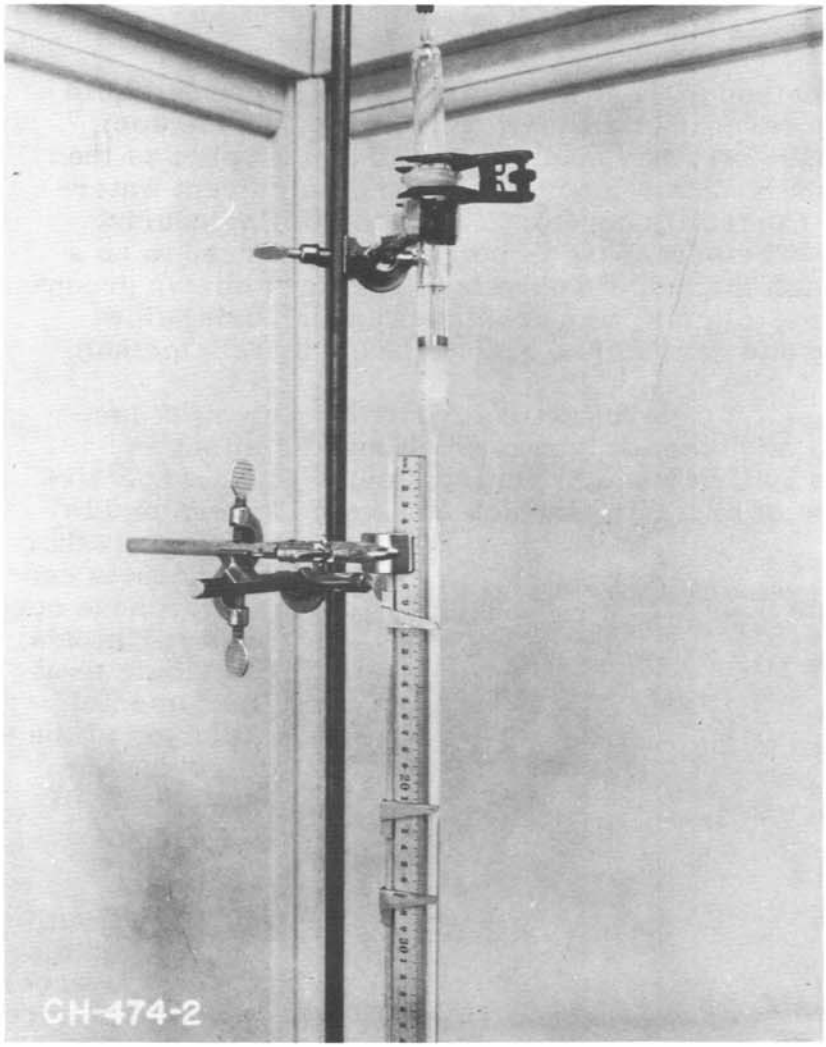
The "Tentative Method of Test for Hydrocarbon Types in liquid Petroleum Products (Fluorescent Indicator Adsorption (FIA) Method)," ASTM Designation: D 1319-54T, has been evaluated and adopted as the method for determining the aromatic content of aromatic solvent water-weed killers in the Weed Control Laboratory, Division of Engineering Laboratories in Denver. The procedure is sometimes referred to as a chromatographic adsorption method of analysis. The three major groups of hydrocarbons (saturates, olefins, and aromatics) which boil below 600° F. can be separated and determined quantitatively by this method.

The method is used to determine the aromatic content of samples of waterweed killers and other solvents which may be effective herbicides. The results will be used in preparation of revised specifications covering purchase of aromatic solvent waterweed killers and in determining whether offered products conform to purchase specifications. The data will contribute to a more fundamental understanding of the factors governing the phytotoxicity of hydrocarbons.



Test Procedure

A small portion (3/4 ml) of the sample to be analyzed is introduced into a reservoir on top of a column of packed adsorbent (silica gel). After the sample is added to the adsorbent, an appropriate desorbing liquid (isopropyl alcohol) is added to the reservoir. Under slight air pressure the desorbing liquid forces the hydrocarbon portion down the column slowly, during which passage the hydrocarbon portion is fractionated and separated into contiguous zones according to the



adsorbability of the components. The lowest zone contains the saturates, the middle zone the olefins, and the top zone the aromatic hydrocarbons. After the top zone has progressed far enough into the analyzer section, the boundary of each zone, which has a distinct color under ultraviolet light caused by the fluorescent indicator dyes added to the sample, is marked. The length of each zone is measured and used to calculate the percentage by volume of each of the groups of hydrocarbons present; the length of each zone is proportional to the percentage of the hydrocarbon groups.

To illustrate the importance of this test in evaluating the herbicidal properties of solvents, results on several samples of hydrocarbons are listed as follows:

Sample No.	Hydrocarbon types (percent by volume) Saturates	Olefins	Aromatics
1	99.7	0.3	0.0
2	86.3	13.7	0.0
3	93.4	0.0	6.6
4	0.0	99.3	0.7
5	4.8	17.1	78.1
6	6.4	8.7	84.9
7	0.0	4.3	95.7
8	0.3	0.7	99.0

Sample Nos. 1, 2, and 3, which contain a high percent of saturates, are found to be ineffective for aquatic weed control. This type of

hydrocarbon is represented by such materials as ordinary gasoline, kerosene, and other straight-chain and branched-chain saturated hydrocarbons.

Sample No. 4 is a branched-chain unsaturated hydrocarbon (olefin). This compound caused some injury to aquatic weeds but not enough to be considered an effective waterweed killer.

Sample Nos. 5, 6, 7, and 8, which contain a high percentage of aromatics, are the most effective for controlling aquatic weeds. Sample No. 6 is more effective than No. 5 at least in part because of the higher aromatic content of No. 6. Sample Nos. 7 and 8 are more effective than Sample Nos. 5 and 6 and are among the best of the aromatic hydrocarbon solvents for control of submersed aquatic weeds. Sample No. 8 is a pure grade of xylene and Sample No. 7, based on its distillation range, probably contains a high percent of xylene.

The above results demonstrate the importance of knowing the percentage of the different types of hydrocarbons represented in an aquatic weed killer. The percent of aromatics, along with the distillation range, is a very useful factor in determining those solvents that are likely to be effective waterweed killers.

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GPO 840391